UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Level

BIOLOGY **9700/01**

Paper 1 Multiple Choice **October/November 2008**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 4 8 0 5 4 7 3 6 5 9 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

This document consists of **17** printed pages and **3** blank pages.

1 Which eyepiece and objective lens combination enables you to see the greatest number of cells in the field of view?

	eyepiece	objective
A	×5	×10
B	×10	×10
C	×5	×40
D	×10	×40

2 From which cell organelle are nucleic acids absent?

A chloroplast

B Golgi apparatus

C mitochondrion

D ribosome

3 Mitochondria are thought to have evolved from prokaryotic cells that were ingested by an ancestral cell.

Which feature have the prokaryotes lost during their evolution into mitochondria?

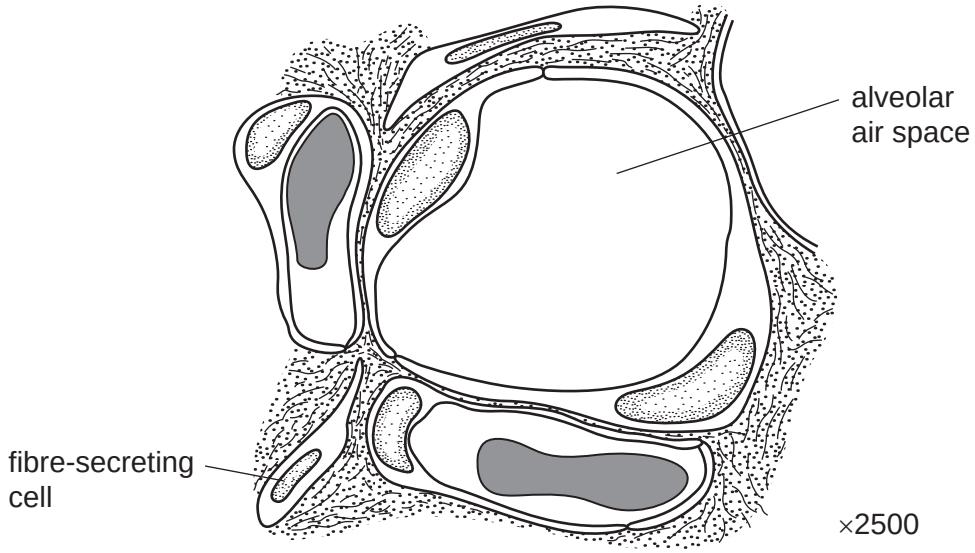
A cell wall

B circular chromosome

C endoplasmic reticulum

D ribosomes

4 The diagram is a drawing made from an electron micrograph showing a cross-section of an alveolus and two adjacent capillaries.



What is the shortest distance travelled by an oxygen molecule diffusing from the alveolar air space into one of the red blood cells?

A 1.0 µm **B** 3.0 µm **C** 10.0 µm **D** 30.0 µm

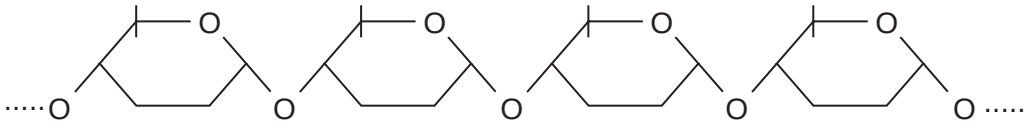
5 Which combination is found in a prokaryotic cell?

	endoplasmic reticulum	DNA	RNA	nucleus
A	✓	✓	✗	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✗	✓	✓

key
✓ = present
✗ = absent

6 Which diagram shows part of a structural polysaccharide?

A



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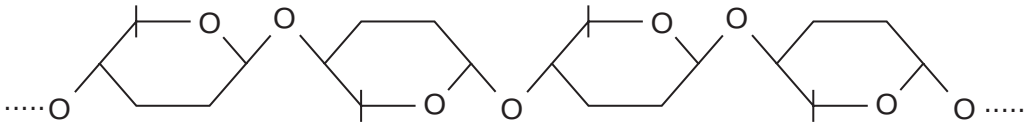

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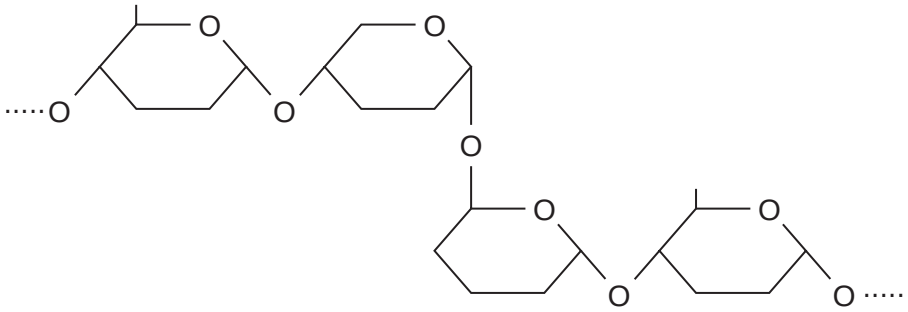

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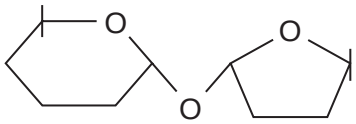


7 Which substances contain carbon, hydrogen, oxygen and nitrogen?

1 amylopectin

2 collagen

3 deoxyribonucleic acid

A 2 only

B 1 and 2 only

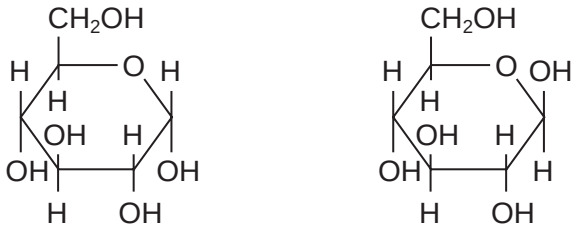
C 2 and 3 only

D 1, 2 and 3

8 Sucrose is a disaccharide formed from two hexose sugars, α-glucose (alpha-glucose) and fructose.

Which pair of monosaccharide structures will be formed when sucrose is hydrolysed?

A



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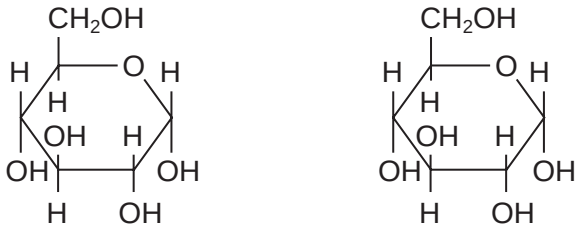


C

D

9 A number of different types of bonds maintain the structure of proteins. These include disulphide, hydrogen and ionic bonds, as well as hydrophobic interactions. Some of these are stronger than others.

Which are the strongest?

A disulphide bonds

B hydrogen bonds

C hydrophobic interactions

D ionic bonds

10 Haemoglobin is a globular protein consisting of four polypeptide chains – 2 alpha chains and 2 beta chains. In normal individuals, in the DNA which codes for each beta chain, the sixth triplet has a code for glutamic acid.

In individuals with sickle cell anaemia this base triplet changes and codes for valine.

What aspect of the haemoglobin molecule does this mutation change?

A the iron content

B the primary structure

C the quaternary structure

D the secondary structure

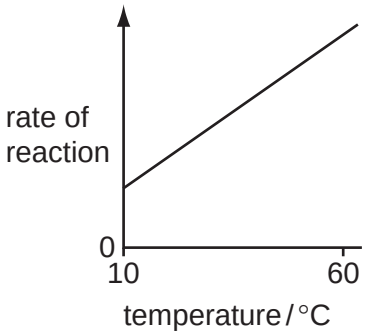
11 Which type of molecule contains disulphide bonds and which contains glycosidic bonds?

	disulphide bonds	glycosidic bonds
A	glycoprotein	polysaccharide
B	nucleic acid	glycoprotein
C	polysaccharide	nucleic acid
D	protein	triglyceride

12 The rate of an enzyme controlled reaction was measured at temperatures within the range 10 - 60 °C.

Which curve represents the most usual relationship between temperature and enzyme activity?

A



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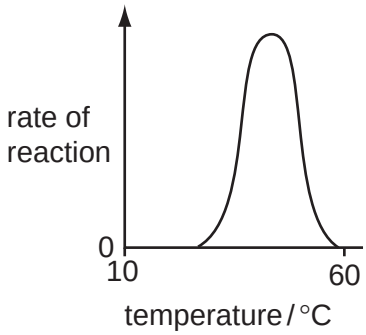

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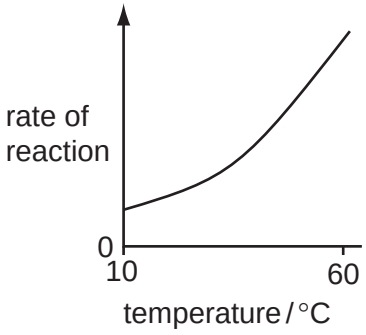

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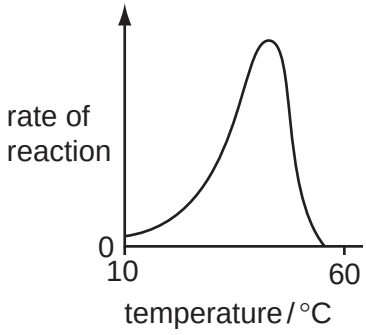
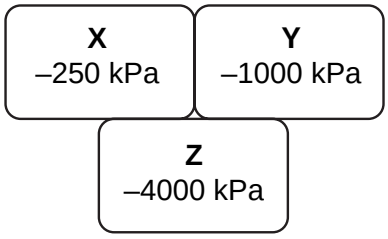


13 The water potential of three adjacent plant cells is shown.



In which direction will water move?

A from cell **X** to cell **Y** and then cell **Z** only

B from cell **X** to both cells **Y** and **Z**

C from cell **Z** to cell **Y** and then cell **X** only

D from cell **Z** to both cells **Y** and **X**

14 The table shows three processes that contribute to transport across cell surface membranes.

Which processes are the result of random movement of molecules?

	diffusion	endocytosis	osmosis
A	✗	✗	✗
B	✗	✓	✓
C	✓	✗	✓
D	✓	✓	✗

key

✓ = random

✗ = non random

15 The epithelial cells of people with cystic fibrosis have a defect in the structure of the cell surface membrane. The ability of the cell to transport chloride ions out of the cell is affected.

Which membrane component is involved?

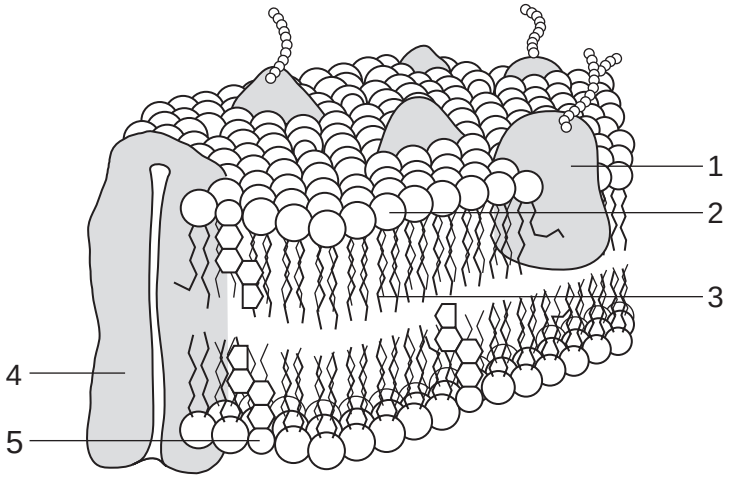
A cholesterol

B glycolipid

C phospholipid

D protein

16 The diagram shows part of the cell surface membrane.



Which components help to maintain the fluidity of the membrane?

A 1 and 3 **B** 1 and 4 **C** 2 and 4 **D** 3 and 5

17 Which statement describes events during interphase of the mitotic cell cycle?

A Chromatids are pulled apart by spindle fibres.

B Chromosomes are replicated ready for the next division.

C Chromosomes line up on the equator of the spindle.

D Chromosomes start to coil, becoming shorter and fatter.

18 Chromosome telomeres promote DNA replication and are not completely replaced during mitosis. A substance **X** is known that completely replaces telomeres during mitosis.

What will be the effect of growing a cell culture with and without substance **X**?

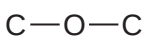
	with substance **X**	without substance **X**
A	cells divide continually	cell division eventually slows and stops
B	cells divide more rapidly	cells divide continually
C	cell division eventually slows and stops	cell division stops immediately
D	cell division stops immediately	cells divide continually

19 What is a correct description of the centrioles, nuclear envelope and spindle during mitosis in animal cells?

	phase	centrioles	nuclear envelope	spindle
A	anaphase	replicate	absent	present
B	metaphase	present	reforms	present
C	prophase	move apart	breaks up	forms
D	telophase	replicate	breaks up	breaks up

20 Which diagram shows the bond linking the individual units of a nucleic acid?

A



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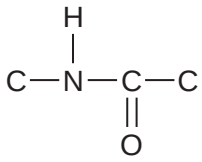
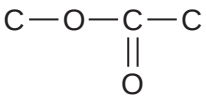


C

D



21 What is the function of the enzyme RNA polymerase?

A to form a polypeptide using mRNA as a template

B to form a strand of DNA using mRNA as a template

C to form a strand of mRNA using DNA as a template

D to form a strand of mRNA using tRNA as a template

22 The table gives the tRNA anticodons for four amino acids.

amino acid	anticodon (tRNA)
asparagine	UUA
glutamic acid	CUU
proline	GGA
threonine	UGG

A cell makes a polypeptide with the amino acid sequence:

glutamic acid – asparagine – threonine – proline

What was the sequence of bases on the strand of the DNA which was complimentary to the mRNA from which this polypeptide was formed?

A CTTTTATGGGGA

B CUUUUAUGGGGA

C GAAAATACCCCT

D GAAAAUACCCCU

23 Four solutions, with different water potentials are listed.

1 endodermal cell solution

2 root hair cell solution

3 soil water solution

4 solution in a xylem vessel

Which list has the solutions in order from the highest (least negative) water potential to the lowest (most negative) water potential?

	highest ⟶ lowest			
A	1	2	3	4
B	2	4	1	3
C	3	2	1	4
D	4	1	3	2

24 Which feature of a root hair cell is **not** an adaptation for water uptake from the soil solution?

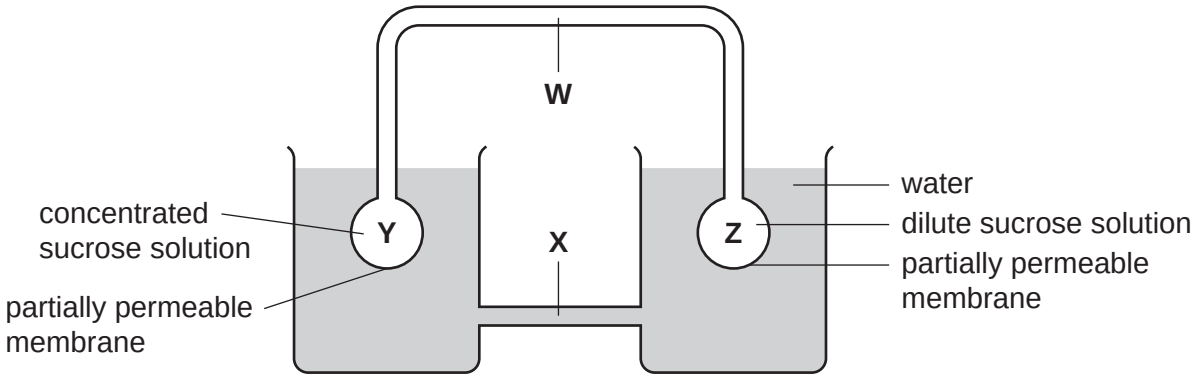
A lack of a waxy cuticle

B large numbers of mitochondria

C long, thin extension to the cell

D thin cellulose cell wall

25 The diagram shows a model to demonstrate the mass-flow hypothesis of translocation.

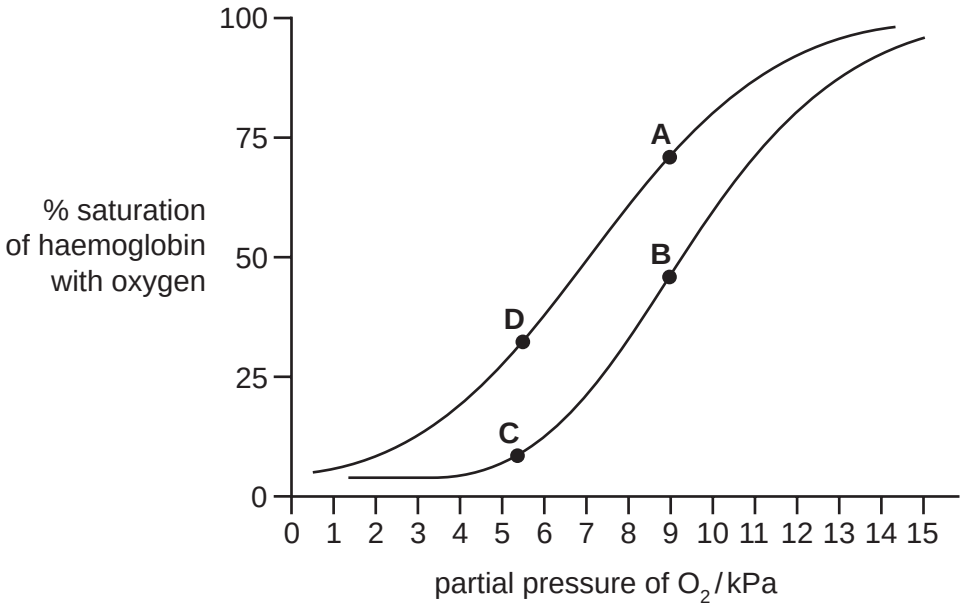


In a plant, what are the structures **W**, **X**, **Y** and **Z** and what is the direction of flow of solution along **W**?

	phloem	xylem	roots	leaves	direction of flow along **W**
A	**W**	**X**	**Y**	**Z**	From **Z** to **Y**
B	**W**	**X**	**Z**	**Y**	From **Y** to **Z**
C	**X**	**W**	**Y**	**Z**	From **Y** to **Z**
D	**X**	**W**	**Z**	**Y**	From **Z** to **Y**

26 The graph shows the dissociation curves for adult haemoglobin at two different (unidentified) concentrations of carbon dioxide.

Which point represents the oxygen concentration in red cells as they leave a resting muscle?



27 Which chamber of the heart shows the greatest pressure changes during one cardiac cycle?

A left atrium

B left ventricle

C right atrium

D right ventricle

28 What happens to the blood flow in the cardiac cycle?

A Blood flows into the aorta through the semilunar valve due to contraction of the right ventricle.

B Blood flows into the left atrium through the pulmonary artery when the walls of the left atrium relax.

C Blood flows into the right atrium through the vena cava when the walls of the right atrium relax.

D Blood flows into the right ventricle through the semilunar valve when the walls of the right atrium contract.

29 The squamous epithelial cells of the alveoli form part of the gas exchange system.

How do these cells assist gas exchange?

1 They contain many mitochondria.

2 They have a large surface area.

3 They provide a short diffusion path.

A 1 and 2 only

B 1 and 3 only

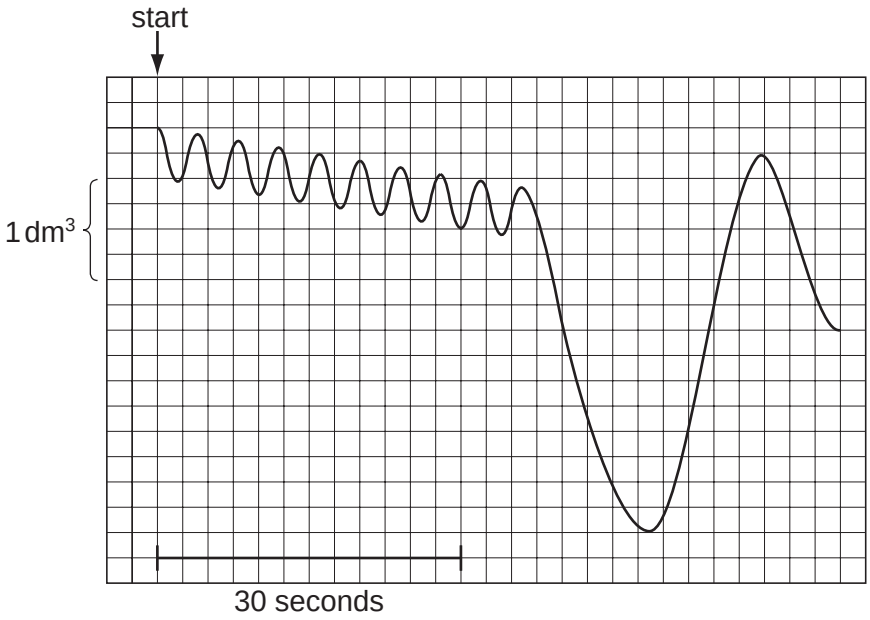
C 2 and 3 only

D 1, 2 and 3

30 Which statements are correct effects of tar in tobacco smoke on the human gas exchange system?

	goblet cells are stimulated to secrete more mucus	mucus glands in the trachea are enlarged	mutations may occur in epithelial cells forming tumors	the activity of cilia in the airays is inhibited
A	✓	✓	✗	✗
B	✗	✓	✓	✓
C	✓	✓	✓	✓
D	✓	✗	✓	✓

31 The diagram shows a record of a person's breathing. The person breathed normally at the start, breathed in as deeply as possible and then breathed out as much as possible.



What is a valid conclusion from the graph?

A The person breathed in 1000 cm^3 during the first 50 seconds.

B The person was carrying out strenuous exercise for the first 30 seconds.

C The rate of breathing for the first 30 seconds was 18 breaths per minute.

D The tidal volume was 500 cm^3, the vital capacity was 3750 cm^3.

32 Ciliated, goblet and squamous epithelial cells are found in various parts of the human lung and associated structures.

Where are these cells located?

	ciliated	goblet	squamous epithelial
A	bronchiole	trachea	alveolus
B	bronchus	bronchiole	pulmonary vein
C	trachea	pulmonary vein	alveolus
D	trachea	bronchus	bronchiole

33 Some antibiotics are used in animal feed to reduce disease.

What explains why these antibiotics should not be used in the treatment of human diseases?

A Humans may be allergic to these antibiotics.

B Human cells may stop responding to these antibiotics.

C Pathogenic bacteria may develop resistance to these antibiotics.

D Useful gut bacteria may be killed by these antibiotics.

34 Some children are born with Severe Combined Immune Deficiency (SCID). These children do not normally have any T-lymphocytes and suffer from many diseases.

How can these children be cured?

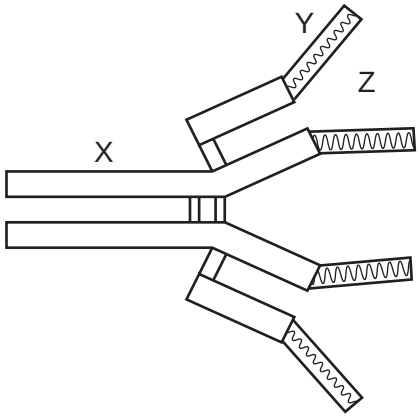
A bone marrow transplantation

B continual use of antibiotics

C transfusion of antibodies

D vaccination against all diseases

35 The diagram represents the structure of a molecule of antibody.



Which arrangement of labels X, Y and Z correctly identifies its different parts?

	X	Y	Z
A	antigen binding site	constant region	variable region
B	constant region	antigen binding site	variable region
C	constant region	variable region	antigen binding site
D	variable region	antigen binding site	constant region

36 Which of the following are increasing the spread of malaria?

1 continued migration of people due to war and civil unrest

2 increasing carbon dioxide levels causing global warming

3 increasing resistance to antibiotics and other drugs

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

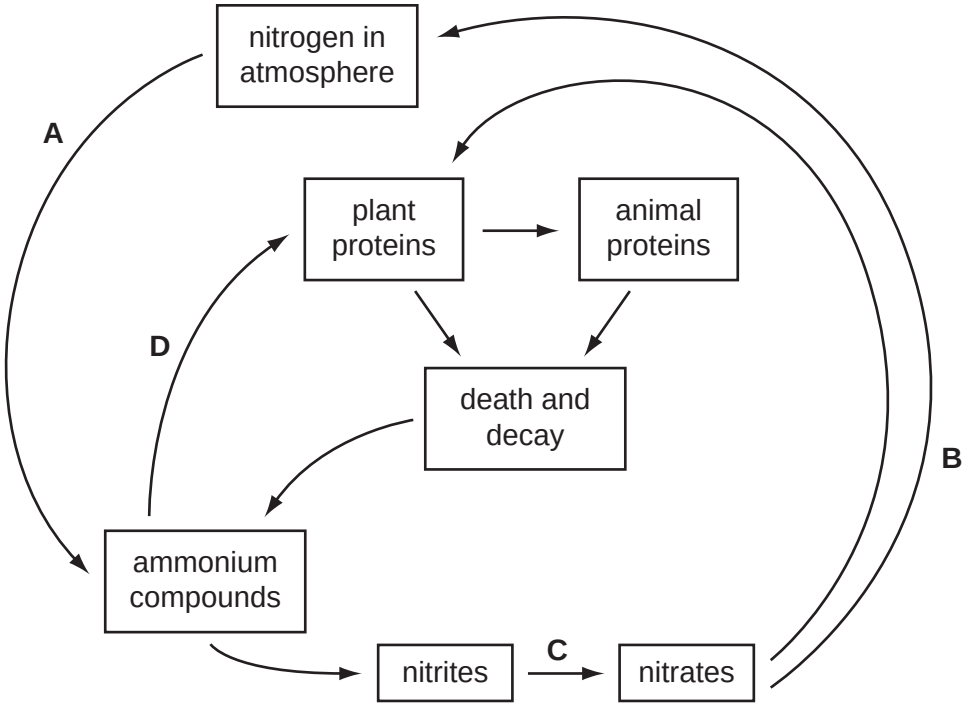
D 1, 2 and 3

37 Which examples show the different types of immunity?

	active artificial	passive natural
A	immunity to measles after infection	receiving antibodies to measles in colostrum
B	immunity to measles after infection	receiving antibodies to tetanus by injection
C	immunity to smallpox after vaccination	receiving antibodies to measles in colostrum
D	immunity to smallpox after vaccination	receiving antibodies to tetanus by injection

38 The diagram shows a simplified nitrogen cycle.

During which stage does nitrification take place?



39 Grasshoppers eat only the leaves of grass. Grasshoppers are eaten by carnivorous beetles.

What does this description of grasshoppers give us sufficient information to define?

1 habitat

2 niche

3 trophic level

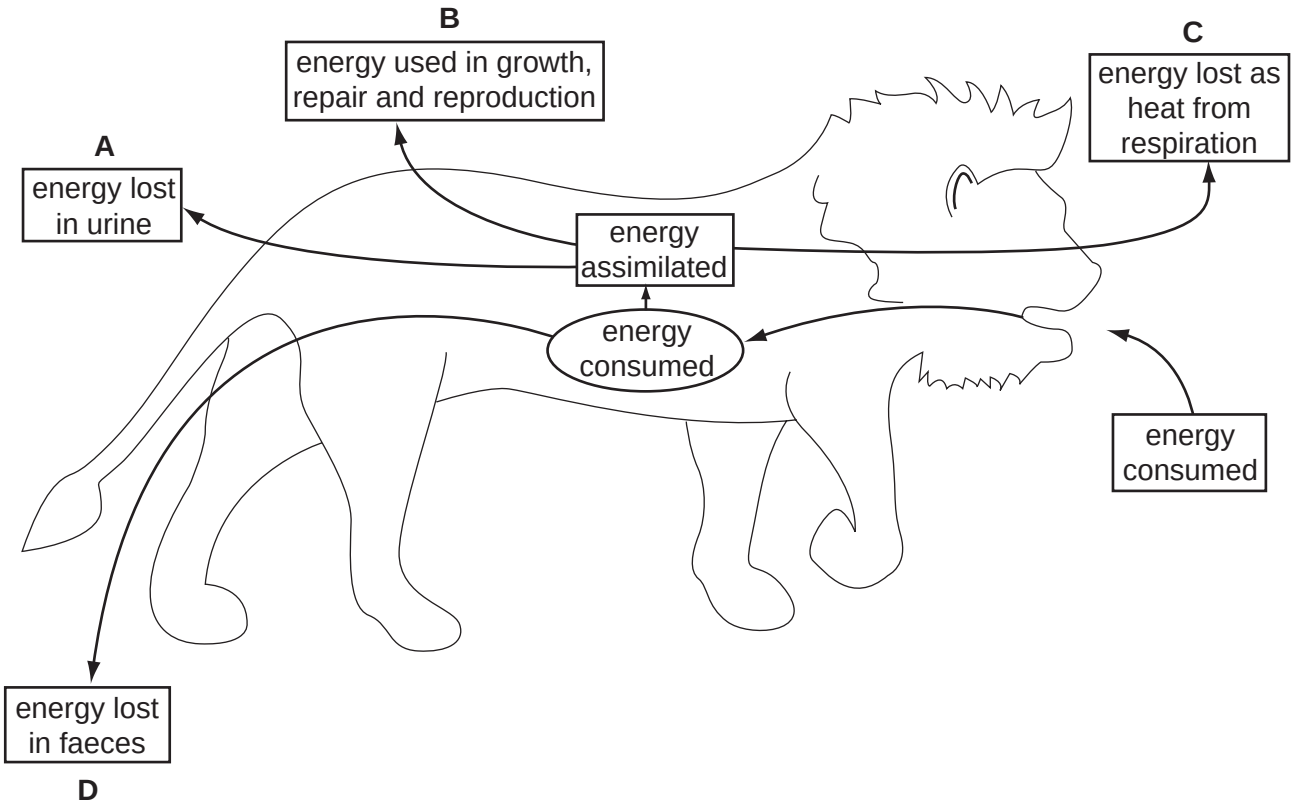
A 2 only

B 3 only

C 2 and 3 only

D 1, 2 and 3

40 Of the prey consumed by the lion, into which box does the largest amount of energy go?



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